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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/824,537	04/15/2004	Tokuhisa Ohiwa	04329.2335-01	6543
22852	7590	04/07/2006	EXAMINER	
FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER LLP 901 NEW YORK AVENUE, NW WASHINGTON, DC 20001-4413			AU, BAC H	
			ART UNIT	PAPER NUMBER
			2822	

DATE MAILED: 04/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

RD

Office Action Summary	Application No. 10/824,537	Applicant(s) OHIWA ET AL.	
	Examiner Bac H. Au	Art Unit 2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 March 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 6-20 is/are pending in the application.
- 4a) Of the above claim(s) 11-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 6-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☒ Certified copies of the priority documents have been received in Application No. 09/604,724.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 6-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gotoh (U.S. Pat. 5650041) in view of Chapman (U.S. Pat. 5976769) and Ha (U.S. Pat. 6117715).

Regarding claim 6, Gotoh [Figs.2a-h] discloses a method of manufacturing a semiconductor device, comprising the steps of:

forming a soluble thin film [4] which is soluble in a dissolving liquid on a film to be processed [2] which is formed on a semiconductor substrate [1];

forming a first mask pattern [5] on the soluble thin film;

etching the soluble thin film and the film to be processed [Fig.2e].

Gotoh fails to disclose a step wherein dissolving the etched soluble thin film in the dissolving liquid, thereby lifting off the second mask pattern from the film to be processed. However, Chapman [Figs.9a-c] discloses wherein dissolving the etched soluble thin film [917,918] in the dissolving liquid, thereby lifting off the second mask pattern from the film [906] to be processed [Col.6, lines 29-39]. It would have been

Art Unit: 2822

obvious to one of ordinary skill in the art at the time of the invention was made to incorporate the teachings of Chapman into the method of Gotoh to include wherein dissolving the etched soluble thin film in the dissolving liquid, thereby lifting off the second mask pattern from the film to be processed. The ordinary artisan would have been motivated to modify Gotoh in the manner set forth above for at least the purpose of overcoming the problem of incomplete removal of photoresist residue by having a liftoff layer, resulting in a more robust photoresist removal method [Chapman; col.1, lines 52-67].

Gotoh fails to disclose the steps of
forming a mask layer on the first mask pattern such that an exposed portion of the soluble thin film is covered with the mask layer;

etching back the mask layer such that an upper face of the first mask pattern is exposed and the portion of the mask layer covering the exposed portion of the soluble thin film remains to form a second mask pattern;

removing the first mask pattern;

etching the soluble thin film and the film to be processed using the second mask pattern as a mask.

However, Ha [Figs.3B-E] discloses a method comprising the steps of:

forming a mask layer [309] on the first mask pattern [306] such that an exposed portion of the soluble thin film [305] is covered with the mask layer;

etching back the mask layer such that an upper face of the first mask pattern is exposed and the portion of the mask layer covering the exposed portion of the soluble thin film remains to form a second mask pattern [Fig.3D];

removing the first mask pattern [Fig.3E];

etching the soluble thin film using the second mask pattern as a mask [Fig.3E].

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Ha into the method of Gotoh to include the steps of forming a mask layer on the first mask pattern such that an exposed portion of the soluble thin film is covered with the mask layer; etching back the mask layer such that an upper face of the first mask pattern is exposed and the portion of the mask layer covering the exposed portion of the soluble thin film remains to form a second mask pattern; removing the first mask pattern; etching the soluble thin film and the film to be processed using the second mask pattern as a mask. The ordinary artisan would have been motivated to modify Gotoh in the manner set forth above for at least the purpose of providing the desired patterning for subsequent processing steps. Utilizing multiple steps of masking and patterning in semiconductor processes is well-known.

Regarding claims 7-8, Chapman discloses

Art Unit: 2822

wherein the soluble thin film [917,918 of Fig.9a] contains at least one compound selected from the group consisting of tungsten oxide, aluminum oxide, titanium oxide, and titanium nitride;

wherein the dissolving liquid is either water or alkaline solution [Col.6, lines 29-32].

Regarding claims 9-10, Gotoh discloses

wherein the step of forming the first mask pattern comprises:

- forming a first mask layer [5];

- forming a resist film [6] with a thickness of 0.3 μm or less on the first mask layer [Col.4, lines 9-16];

- patterning the resist film by using photo-lithography technique to form a resist pattern [Figs.2a-c; col.4, lines 5-26]; and

- etching the first mask layer using the resist pattern as a mask, thereby forming the first mask pattern [Figs.2a-c; col.4, lines 5-26];

wherein the step of etching the soluble thin film [4] and the film to be processed [2] comprises forming a contact hole in the film to be processed [Fig.2e].

Response to Arguments

2. Applicant's arguments with respect to claims 6-10 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion


3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bac H. Au whose telephone number is 571-272-8795. The examiner can normally be reached on Mon-Fri 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra Smith can be reached on 571-272-2429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

BHA


Zandra V. Smith
Supervisory Patent Examiner
31 March 2006